

State of California  
**AIR RESOURCES BOARD**

**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES  
FOR 2004 AND SUBSEQUENT MODEL  
HEAVY-DUTY DIESEL-ENGINES AND VEHICLES**

Adopted: December 12, 2002

NOTE: The format of this document has been reorganized and updated from the previous version of these test procedures that were entitled the "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles.

# Table of Contents

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## **PART I. GENERAL PROVISIONS FOR CERTIFICATION AND IN-USE VERIFICATION OF EMISSIONS.**

	<b>1</b>
1. General Applicability. [86.xxx-1]	1
2. Definitions. [§86.xxx-2]	3
3. Abbreviations. [§86.xxx-3]	4
4. Section numbering; construction. [§86.084-4].	4
5. General Standards; increase in emissions; unsafe conditions. [§86.090-5]	5
6. Hearings on certification. [§86.078-6]	5
7. Maintenance of records; submittal of information; right of entry. [§86.000-7]	5
8. Emission standards for light-duty vehicles. [§86.xxx-8] [n/a]	5
9. Emission standards for light-duty trucks. [§86.xxx-9] [n/a]	5
10. Emission standards for Otto-cycle heavy-duty engines and vehicles. [§86.xxx-10]	5
11. Emission standards for diesel heavy-duty engines and vehicles. [§86.xxx-11]	5
12. Alternative certification procedures.	9
13. Alternative durability program. §86.xxx-13	10
14. Small-volume manufacturers certification procedures. §86.xxx-14	10
15. NOx plus NMHC and particulate averaging, trading, and banking for heavy-duty engines §86.xxx-10	10
16. Prohibition of defeat devices. §86.000-16	14
17. On-board diagnostics. §86.099-17; 86.005-17;	14
18. §86.xxx-18. [Reserved.]	14
19. §86.xxx-19. [Reserved.]	14
20. Incomplete vehicles, classification. §86.085-20	14
21. Application for certification. [§86.xxx-21]	14
22. Approval of application for certification; test fleet selections; determinations of parameters subject to adjustment for certification and Selective Enforcement Audit, adequacy of limits, and physically adjustable ranges. [§86.001-22]	15
23. Required data. [§86.xxx-23]	16
24. Test vehicles and engines. §86.xxx-24	16
25. Maintenance. §86.xxx-25	16
26. Mileage and service accumulation; emission measurements. §86.004-26	17
27. Special test procedures. §86.090-27	17
28. Compliance with emission standards. §86.xxx-28	17
29. Testing by the Administrator. §86.091-29	17
30. Certification. §86.xxx-30	17
31. Separate certification. §86.079-31	18
32. Addition of a vehicle or engine after certification. §86.xxx-33	18
33. Changes to a vehicle or engine covered by certification. §86.xxx-34	18
34. Alternative procedure for notification of additions and changes.	18
35. Labeling. §86.xxx-35,	18
36. Submission of vehicle identification numbers. §86.079-36	20
37. Production vehicles and engines. §86.085-37	20
38. Maintenance instructions. §86.xxx-38	20

39.	Submission of maintenance instructions. §86.079-39	21
40.	Heavy-duty engine rebuilding practices. §86.xxx-40	21

## **PART II TEST PROCEDURES** **22**

<b>Subpart I - Emission Regulations for New Diesel-Fueled Heavy-Duty Engines; Smoke Exhaust Test Procedure</b>	<b>22</b>
--	-----------

<b>Subpart N - Emission Regulations for New Otto-Cycle and Diesel Heavy-Duty Engines; Gaseous and Particulate Exhaust Test Procedures</b>	<b>23</b>
---	-----------

<b>Appendix I - Urban Dynamometer Schedules.</b>	<b>43</b>
(f)(2) EPA Engine Dynamometer Schedule for Heavy -Duty Diesel Engines.	43

# **CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 2004 AND SUBSEQUENT MODEL HEAVY-DUTY DIESEL-ENGINES AND VEHICLES**

The following provisions of Subparts A, I, and N, Part 86, Title 40, Code of Federal Regulations, as adopted or amended by the U.S. Environmental Protection Agency on the date set forth next to the 40 CFR Part 86 section listed below, and only to the extent they pertain to the testing and compliance of exhaust emissions from heavy-duty diesel engines and vehicles, are adopted and incorporated herein by this reference as the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," except as altered or replaced by the provisions set forth below.

## **Part I. GENERAL PROVISIONS FOR CERTIFICATION AND IN-USE VERIFICATION OF EMISSIONS.**

### **Subpart A - General Provisions for Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Engines, and for 1985 and Later Model Year New Gasoline-Fueled, Natural Gas-Fueled, Liquefied Petroleum Gas-Fueled and Methanol-Fueled Heavy-Duty Vehicles.**

#### **1. General Applicability. [86.xxx-1]**

##### **A. Federal Provisions.**

##### **1. §86.001-1 October 6, 2000.**

1.1 Subparagraph (a) [No change.]

1.2 Subparagraph (b) *Optional Applicability.* [No change.]

1.3 Subparagraphs (c) and (d) Reserved

1.4 Amend subparagraph (e) as follows: *Small volume manufacturers.*

Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line (including all vehicles and engines imported under the provisions of 40 CFR §§85.1505 and 85.1509 of this chapter) are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For a manufacturer certifying for the first time in California, model-year production shall be based on projected California sales. To certify its product line under these optional procedures, the small-volume manufacturer must first obtain the Executive Officer's approval. The manufacturer must meet the eligibility criteria specified in 40 CFR §86.092-14(b) before the Executive Officer's approval will be

granted. The small volume manufacturer's heavy-duty engine certification procedures are described in 40 CFR '§ 86.092-14.

1.5 Subparagraph (f) *Optional procedures for determining exhaust opacity.* [No change.]

2. **§86.005-1** October 6, 2000

2.1 Subparagraph (a) [No change.]

2.2 Subparagraph (b) *Optional Applicability.* [No change.]

2.3 Subparagraph (c) [n/a; Otto-cycle]

2.4 Subparagraph (d) Reserved

2.5 Amend subparagraph (e) as follows: *Small volume manufacturers.*

Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line (including all vehicles and engines imported under the provisions of 40 CFR §§85.1505 and 85.1509 of this chapter) are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For a manufacturer certifying for the first time in California, model-year production shall be based on projected California sales. To certify its product line under these optional procedures, the small-volume manufacturer must first obtain the Executive Officer's approval. The manufacturer must meet the eligibility criteria specified in 40 CFR §86.092-14(b) before the Executive Officer's approval will be granted. The small volume manufacturer's heavy-duty engine certification procedures are described in 40 CFR '§ 86.092-14.

2.6 Subparagraph (f) *Optional procedures for determining exhaust opacity.* [No change.]

**B. California provisions.**

1. These regulations shall be applicable to all heavy-duty diesel methanol-fueled, ethanol-fueled, natural-gas-fueled and liquefied-petroleum gas-fueled dedicated, dual-fuel and multi-fuel engines (and vehicles) including those engines derived from existing diesel engines. For any engine that is not a distinctly diesel engine nor derived from such, the Executive Officer shall determine whether the engine shall be subject to these regulations or alternatively to the heavy-duty Otto-cycle engine regulations, in consideration of the relative similarity of the engine's torque-speed characteristics and vehicle applications with those of diesel and Otto-cycle engines. Reference to dual fuel vehicles or engines shall also mean bi-fuel vehicles or engines. References to methanol shall also mean ethanol.

2. References in the federal regulations to light-duty vehicles and light-duty trucks do not apply. References to heavy-duty Otto-cycle engines or vehicles do not apply.

3. Any reference to vehicle or engine sales or vehicle or engine production volume throughout the United States shall mean vehicle or engine sales or vehicle or engine volume in California. References to small volume manufacturers shall mean California small volume manufacturer as defined in section I.1.A., above.

4. Regulations concerning U.S. EPA hearings, U.S. EPA inspections, specific language on the Certificate of Conformity, non-conformance penalties, selective enforcement audit, evaporative emission, high-altitude vehicles and testing, alternative useful life, and Certification Short Test shall not be applicable to these procedures, except where specifically noted. The regulations pertaining to evaporative emissions are contained in "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," as incorporated in title 13, CCR §1976. All heavy-duty methanol- and gaseous-fueled vehicles shall comply with the evaporative requirements in title 13, CCR, §1976.

2. Definitions. [§86.xxx-2]

**A. Federal Provisions.**

1. **§86.004-2** January 18, 2001. [All federal definitions apply, except as otherwise noted below. Definitions specific to other requirements are contained in separate documents.]

**B. California Provisions.**

**"Administrator"** means the Executive Officer of the Air Resources Board.

**"Certificate of Conformity"** means "Executive Order" certifying vehicles for sale in California.

**"Certification"** means certification as defined in Section 39018 of the Health and Safety Code.

**"EPA"** shall also mean Air Resources Board or Executive Officer of the Air Resources Board

**"EPA Enforcement Officer"** means the Executive Officer or his delegate.

**"Medium-duty engine"** means a heavy-duty engine that is used to propel a medium-duty vehicle.

**"Medium-duty vehicle"** means 2004 through 2006 model year heavy-duty low-emission vehicle, ultra-low-emission vehicle, super-ultra-low-emission vehicle or zero-emission vehicle certified to the standards in title 13, CCR, section 1960.1(h)(2) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; and any 2004 and subsequent model heavy-duty low-

emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in title 13, CCR section 1956.8(h), having a manufacturer's gross vehicle weight rating between 8,501 and 14,000 pounds. **"Warranty period"** [For guidance see title 13, CCR, §' 2036].

3. Abbreviations. [§86.xxx-3]

**A. Federal Provisions.**

1. **§86.000-3 Abbreviations.** October 22, 1996. [All federal abbreviations apply, except as otherwise noted below. Abbreviations specific to other requirements are contained in separate documents.]

**B. California Provisions.**

"CCR" means "California Code of Regulations

"LEV" means low-emission vehicle

"MDV" means medium-duty vehicle

"OBD" means on-board diagnostics

"ULEV" means ultra-low-emission vehicle

"SULEV" means super-ultra-low-emission vehicle

4. Section numbering; construction. [§86.084-4]. September 21, 1994. [No change.]

The section numbering convention employed in these test procedures, in order of priority, is I.1.A.1.1. in order to distinguish California procedures and requirements from those of the U.S. EPA. References in these test procedures to specific sections of the Code of Federal Regulations maintain the same numbering system employed in the Code of Federal Regulations. California-only requirements are set forth in a separate subsection. In the beginning of each section the general notation §86.xxx-# is used when there is more than one applicable section (or when no versions of the section are being incorporated) to indicate the section being discussed without regard to model year. The years of applicability (denoted generically "xxx") are added as applicable in the pertinent subsections.

In cases where the entire CFR section is incorporated by reference with no modifications, the notation "[No change.]" is used. In cases where the federal requirements are modified by California requirements, the notation "Amend (or delete) subparagraph ( ) as follows:" is used. If the federal requirement is not applicable, the notation "[n/a]" is used. In cases where there are California only requirements, the additional California requirements are noted in a separate subsection with the numbering convention set forth above.

If a CFR section for a specific model year is set forth in this document, and that CFR section references previous CFR sections, then all previously referenced CFR sections are deemed incorporated into this document unless otherwise noted.

5. General Standards; increase in emissions; unsafe conditions. [§86.090-5] November 12, 1996. [No change.]
6. Hearings on certification. [§86.078-6] December 12, 1984 [No change.]
7. Maintenance of records; submittal of information; right of entry. [§86.000-7] October 22, 1996. [No change.]
8. Emission standards for light-duty vehicles. [§86.xxx-8] [n/a]
9. Emission standards for light-duty trucks. [§86.xxx-9] [n/a]
10. Emission standards for Otto-cycle heavy-duty engines and vehicles. [§86.xxx-10] [n/a]
11. Emission standards for diesel heavy-duty engines and vehicles. [§86.xxx-11]
  - A. Federal provisions.**
    - 1. §86.004-11 Emission standards for 2004 and later model year diesel heavy-duty engines and vehicles.** October 6, 2000.
      - 1.1 Amend subparagraph (a) as follows:
        - 1.1.1 Amend subparagraph (a)(1) Exhaust emissions from new 2004 through 2006 model year diesel HDEs, other than diesel-fueled, dual fuel and bi-fuel urban buses, shall not exceed the following:
        - 1.1.2 Subparagraphs (a)(1)(i) through (a)(iii)(C) [No change.]
        - 1.1.3 Amend subparagraph (a)(2) as follows: The standards set forth in paragraph (a)(1) of this section refer to the exhaust emitted over the operating schedule set forth in paragraph (f)(2) of appendix I to this part, and measured and calculated in accordance with the procedures set forth in subpart N of this part as amended in part II of these test procedures, except as noted in §86.098-28(c)(2) or superseding sections.
      - 1.2. Subparagraph (b). [No change.]
      - 1.3. Subparagraph (c). [No change.]
      - 1.4 Amend subparagraph (d) as follows: Every manufacturer of new motor vehicle engines subject to the standards prescribed in title 13, CCR, §1956.8 (a), §1956.8 (h), and this section shall, prior to taking any of the actions prohibited by California Health & Safety Code section 43211 or as specified in section 203(a)(1) of the Act, test or cause to be tested motor vehicle engines in accordance with applicable procedures in subpart I or N as amended by these test procedures to ascertain that such test engines meet the requirements of paragraphs (a), (b), (c), and (d) of this section.
      - 1.5 Subparagraph (e). [No change.]



**2. §86.007-11 Emission standards and supplemental requirements for 2007 and later model year diesel heavy-duty engines and vehicles.** January 18, 2001.

2.1. Add the following sentence to the introductory paragraph: Except as otherwise noted, references in this subsection to heavy-duty engines or HDEs shall include medium-duty engines as defined in Section I.2.B of these test procedures.

2.2 Subparagraphs (a) and (a)(1). [No change.]

2.2.1 Amend subparagraph (a)(2) as follows: The standards set forth in paragraph (a)(1) of this section refer to the exhaust emitted over the operating schedule set forth in paragraph (f)(2) of appendix I to this part, and measured and calculated in accordance with the procedures set forth in subpart N of this part as amended in part II of these test procedures, except as noted in §86.007-23(c)(2) or superseding sections.

2.2.2. Delete subparagraph (a)(3). [For guidance see Subpart N, §86.1360-2007 of these test procedures].

2.2.3. Delete subparagraph (a)(4). [For guidance see Subpart N, §86.1370-2007 of these test procedures]

2.3 Subparagraphs (b)(1)(i) through (b)(1)(iii). [No change.]

2.3.1 Delete subparagraph (b)(1)(iv). [For guidance see Subpart N, §86.1370-2007 of these test procedures]

2.3.2 Subparagraphs (b)(2)(i). [No change.]

2.3.3 Delete subparagraph (b)(2)(ii). [For guidance see Subpart N, §86.1370-2007 of these test procedures]

2.3.4 Subparagraph (b)(3) and (b)(4). [No change.]

2.4 Subparagraph (c). [No change.]

2.5. Amend subparagraph (d) as follows: Every manufacturer of new motor vehicle engines subject to the standards prescribed in title 13, CCR, §1956.8 (a), §1956.8 (h), and this section shall, prior to taking any of the actions prohibited by California Health & Safety Code section 43211 or as specified in section 203(a)(1) of the Act, test or cause to be tested motor vehicle engines in accordance with applicable procedures in subpart I or N as amended in part II of these test procedures to ascertain that such test engines meet the requirements of paragraphs (a), (b), (c), and (d) of this section.

2.6 Subparagraphs (e) through (h). [No change.]

**B. California provisions.**

**1. Urban Bus Standards.**

1.1 The exhaust emissions from new 2004 through 2006 model year heavy-duty engines (other than diesel-fueled, dual-fuel and bi-fuel heavy-duty engines) used in urban buses shall not exceed the standards set forth in 40 CFR §86.004-11(a)(1), above.

1.2 The exhaust emissions, as measured under transient operating conditions, from 2004 through 2006 model year diesel-fueled, dual-fuel and bi-fuel heavy-duty engines used in urban buses shall not exceed:

<b>2004 – 2006 Heavy-Duty Diesel-Fuel, Dual Fuel, and Bi-Fuel Urban Bus Engine Exhaust Emission Standards*</b> <b>(grams per brake horsepower-hour or g/bhp-hr)</b>				
<b>NO<sub>x</sub><sup>1</sup></b>	<b>NMHC or NMHCE</b>	<b>CO<sup>3</sup></b>	<b>PM<sup>2</sup></b>	<b>HCHO<sup>4</sup></b>
0.5 (0.2 g/megajoule)	0.05 (0.02 g/megajoule)	5.0 (1.9 g/megajoule); [7.0 (2.6 g/megajoule)]	0.01 (0.004 g/megajoule)	0.01 (0.004 g/megajoule)

- <sup>1</sup> Oxides of Nitrogen (NO<sub>x</sub>). This standard is for certification testing and selective enforcement audit testing. As an option, manufacturers may choose to meet the NO<sub>x</sub> standard with a base engine that is certified to the standards in §86.004-11(a)(1), (October 6, 2000), equipped with an aftertreatment system that reduces NO<sub>x</sub> to 0.5 g/bhp-hr and PM to 0.01 g/bhp-hr. The NMHC, CO, and formaldehyde standards above shall still apply. Manufacturers shall be responsible for full certification, durability, testing, and warranty and other requirements for the base engine. For the aftertreatment system, manufacturers shall not be subject to the certification durability requirements, or in-use recall and enforcement provisions, but are subject to warranty provisions for functionality.
- <sup>2</sup> Particulates. This standard is for certification testing, selective enforcement audit testing, and in-use testing. As an option, manufacturers may choose to meet the PM standard with an aftertreatment system that reduces PM to 0.01 g/bhp-hr. Manufacturers shall be responsible for full certification, durability, testing, and warranty and other requirements for the base engine. For the aftertreatment system, manufacturers shall not be subject to the certification durability requirements, or in-use recall and enforcement provisions, but are subject to warranty provisions for functionality.
- <sup>3</sup> Carbon monoxide. The 5.0 g/bhp-hr (1.9 grams per megajoule) standard is for certification testing and selective enforcement audit testing, and the 7.0 g/bhp-hr (2.6 grams per megajoule) standard is for in-use testing.
- <sup>4</sup> Formaldehyde. This standard is for certification testing, selective enforcement audit testing and in-use testing.

1.3 The exhaust emissions from new 2007 and subsequent model year heavy-duty engines used in urban buses shall not exceed the following standards:

<b>2007 and Subsequent Heavy-Duty Diesel Urban Bus Engine Exhaust Emission Standards*</b> <b>(grams per brake-horsepower-hour or g/bhp-hr)</b>				
<b>NO<sub>x</sub></b>	<b>NMHC or NMHCE</b>	<b>CO</b>	<b>PM</b>	<b>HCHO</b>
0.2 (0.075 g/megajoule)	0.05 (0.02 g/megajoule)	5.0 (1.9 g/megajoule)	0.01 (0.004 g/megajoule)	0.01 (0.004 g/megajoule)

**2. Optional HDE and Urban Bus Standards.** A manufacturer may elect to certify 2004 through 2006 model year heavy-duty diesel engines greater than

14,000 pounds gross vehicle weight rating and heavy-duty engines used in urban buses [excluding diesel-fuel, dual-fuel and bi-fuel heavy-duty diesel engines used in urban bus engines] to the following standards, as measured under transient operating conditions. Engines certified to these standards are not eligible to participate in NOx, NOx plus NMHC, or particulate ABT programs.

<b>OPTIONAL STANDARDS</b> <b>Heavy-Duty Diesel Engines &gt;14,000 lbs. GVW</b> <b>(excluding diesel-fueled, dual fuel, and bi-fuel Urban Buses)</b> (grams per brake-horsepower-hour or g/bhp-hr)			
<b>Model Year</b>	<b>NOx plus NMHC (or NMHCE)*</b>	<b>CO</b>	<b>PM</b>
2004–2006*	0.3 to 1.8, inclusive; (in 0.3 g/bhp-hr increments)	15.5	0.01; 0.02; or 0.03

\*NOx plus NMHC are measured as the arithmetic sum of the NOx plus NMHC exhaust component certification values.

3. **Formaldehyde Standards.** Formaldehyde exhaust emissions from new 2004 through 2006 model methanol-fueled diesel engines, shall not exceed 0.05 g/bhp-hr.

4. **Requirements for Dual- and Bi-Fuel Engines.** For the 2004 through 2006 model years, an engine family whose design allows engine operation in either of two distinct alternative fueling modes, where each fueling mode is characterized by use of one fuel or a combination of two fuels and significantly different emission levels under each mode, may certify to a different NOx plus NMHC (depending on model year) standard for each fueling mode, provided it meets the following requirements:

(1) The NOx plus NMHC certification standard used for certification under the higher emitting fueling mode must be the standard contained in paragraph 11.A.1 above as appropriate.

(2) The NOx plus NMHC certification standard used for certification under the lower emitting fueling mode must be one of the reduced-emission standards contained in paragraph 11.B.2 above, as appropriate.

(3) The engine family is not used to participate in any manufacturer's averaging, banking or trading program.

(4) The engine family meets all other applicable emission standards in each fueling mode.

(5) The higher emitting fueling mode must be intended only for fail-safe vehicle operation in the case of a malfunction or inadvertent fuel depletion which precludes normal operation in the lower emitting fueling mode. Evidence of such design intent would be a significantly reduced horsepower versus engine speed

curve when operating in the higher emitting fueling mode as compared to the curve while operating in the lower emitting fueling mode.

(6) All applicable exhaust emission testing, data submission, and certification application requirements must be met separately for each of the two fueling modes of operation, but should be submitted for ARB approval in a single package.

**5. Standards for Medium-Duty Engines.** A manufacturer of heavy-duty engines used in medium-duty vehicles may choose to comply with the following standards as an alternative to the primary emission standards and test procedures specified in title 13, CCR, §1961. A manufacturer that chooses to comply with these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in title 13, CCR, §2139(c).

The exhaust emissions from new 2004 and subsequent model heavy-duty diesel engines used in ultra-low emission and super-ultra-low emission medium-duty diesel vehicles shall not exceed:

Exhaust Emission Standards for 2004 – 2006 Model Medium-Duty ULEVs and SULEVs					
Vehicle Emission Category	NOx + NMHC		CO	PM	HCHO
ULEV <sup>1</sup> Option A	2.5 (with a 0.5 cap on NMHC)		14.4	0.10	0.05
ULEV <sup>1</sup> ; Option B	2.4		14.4	0.10	0.05
Exhaust Emission Standards for 2007 and Subsequent Model Medium-Duty ULEVs and SULEVs					
Vehicle Emission Category	NOx	NMHC or NMHCE	CO	PM	HCHO
ULEV <sup>1</sup>	See 40 CFR §86.007-11(a)(1)(i)	See 40 CFR §86.007-11(a)(1)(ii)	See 40 CFR §86.007-11(a)(1)(iii)	See 40 CFR §86.007-11(a)(1)(iv)	0.01
SULEV <sup>1</sup>	0.1	0.07	7.7	0.005	0.005

<sup>1</sup> Emissions averaging may be used to meet these standards using the requirements for participation averaging, banking and trading programs, as set forth in Section I.15 of these test procedures.

12. Alternative certification procedures. §86.080-12 April 17, 1980. [No change.]

13. Alternative durability program. §86.xxx-13 April 17, 1980. [n/a; light-duty only.]

14. Small-volume manufacturers certification procedures. §86.xxx-14 April 6, 1994.

**A. Federal provisions.** [A small volume manufacturer shall mean a California small volume manufacturer as defined in §86.001-1 (e), as modified above. Any reference to 10,000 units shall mean 4,500 units in California based on the average number of units sold for the three previous consecutive model years defined in §86.001-1 (e), as modified in Section I.1.A, above.]

1. **§86.094-14** January 3, 1996. Amend as follows:

1.1 Subparagraphs (a) through (c)(3) [No change.]

1.2 Amend subparagraph (c)(4) as follows: Delete the last sentence, "However, the manufacturer is not required to submit the information to the Administrator unless the Administrator requests it."

1.3 Subparagraphs (c)(5) through (c)(7)(i)(B) [No change.]

1.4 Amend subparagraph (c)(7)(i)(C)(1) as follows: Manufacturers with aggregated sales of less than 301 motor vehicles and motor vehicles engines per year may use assigned deterioration factors that the Executive Officer determines and prescribes based on design specifications or sufficient control over design specifications, development data, in-house testing procedures, and in-use experience. [The remainder of the paragraph is the same.]

1.5 Subparagraphs (c)(7)(i)(C)(2) through (c)(13)(i) [No change.]

1.6 Add the following sentence to subparagraph (c)(13)(ii): All running changes that do not adversely affect emissions or the emission control system durability shall be deemed approved unless disapproved by the Executive Officer within 30 days of the implementation of the running change.

2. **§86.096-14** March 24, 1993. [No change; pertains to evaporative requirements.]

3. **§86.098-14** April 6, 1994. [No change; pertains to evaporative requirements.]

15. NO<sub>x</sub> plus NMHC and particulate averaging, trading, and banking for heavy-duty engines §86.xxx-15.

**A. Federal provisions.**

1. **§86.004-15** February 6, 2000. Amend as follows:

1.1 Add the following sentence to subparagraph (a)(1): Except as otherwise noted, references in this subsection to engines, heavy-duty engines, or HDEs shall include medium-duty engines.

1.2 Subparagraphs (a)(2) through (b)(1)(ii)(A) [No change.]

1.3 Subparagraph (b)(1)(ii)(B). Add the following sentence: In the case of medium-duty engines the FEL is subject to the same upper limit as required for heavy-duty engines.

1.4 Subparagraphs (b)(1)(iii) through (b)(1)(iv)(B). [No change.]

1.5 Subparagraph (b)(1)(iv)(C). Add the following sentence: Credits generated before the year 2004 to be used to certify engines in the combined light heavy-duty and medium-duty averaging set, as described in paragraphs (d)(2)(i) and (e)(2), in the year 2004 and later, must have been generated through the sale of engines in California.

1.6 Subparagraph (b)(2)(i). [No change.]

1.7 Subparagraph (b)(2)(ii) Amend as follows: (ii) The source of the credits to be used to comply with the emission standard if the FEL exceeds the standard, or where credits will be applied if the FEL is less than the emission standard. In cases where credits are being obtained, each engine family involved must state specifically the source (manufacturer/engine family) of the credits being used, including the year of generation of the credits being used and whether the credits were generated from engines sold in California or from 49-state engines. In cases where credits are being generated/supplied, each engine family involved must state specifically the designated use (manufacturer/engine family or reserved) of the credits involved. All such reports shall include all credits involved in averaging, trading or banking.

1.8 Subparagraphs (b)(3) through (c)(1)(ii). [No change.]

1.9 Subparagraph (c)(1)(iii). Add the following sentence: For medium-duty engines certified in the 2004 and 2005 model years, an additional adjustment to the Std value described in this subparagraph (c)(1)(iii), allowing for certification using Federal certification fuel may be made on an individual engine family basis as determined by the ARB Executive Officer upon application by the engine manufacturer.

1.10 Subparagraphs (c)(2) through (d)(1). [No change.]

1.11 Subparagraph (d)(2). Amend as follows: For NOx plus NMHC credits from diesel-cycle heavy-duty engines:

(i) Heavy heavy-duty engines and medium heavy-duty engines, as defined in §86.004-2, each constitute an averaging set. Light heavy-duty engines, as defined in '§ 86.004-2, for use in vehicles of more than 14,000 pounds gross vehicle weight rating and medium-duty engines, combined constitute an averaging set. Averaging and trading among all diesel-cycle engine families within the same averaging set is allowed.

(ii) Engines intended for use in urban buses constitute a separate averaging set from all other heavy-duty engines. Averaging and trading between diesel cycle bus engine families within the same averaging set is allowed.

1.12 Subparagraphs (e) and (e)(1). [No change.]

1.13 Subparagraph (e)(2) Amend as follows: (e)(2)

(i) For heavy-duty engines, exclusive of urban bus engines, heavy heavy-duty engines and medium heavy-duty engines, as defined in §86.004-2, each constitute an averaging set. Light heavy-duty engines, as defined in §86.004-2, for use in vehicles of more than 14,000 pounds gross vehicle weight rating and medium-duty engines, combined constitute an averaging set. Averaging and trading between diesel-cycle engine families within the same averaging set is allowed.

1.14 Subparagraphs (e)(3) through (f)(3)(ii). [No change.]

1.15 Subparagraph (f)(3)(iii) Add the following sentences: Banked credits generated before the 2004 model year to be applied toward the certification of engines in the combined light heavy-duty and medium-duty averaging set, as described in paragraphs (d)(2)(i) and (e)(2) above, must have been generated through the sale of eligible engines within California. Credits generated before the 2004 model year from engines sold outside of California may not be used to certify light heavy-duty or medium-duty engines for sale in California. Manufacturers subject to the consent decree shall bank and use credits as allowed in their respective consent decrees.<sup>1</sup>

1.16 Subparagraphs (g) through (i). [No change.]

1.17 Subparagraph (j) Credit apportionment. Delete; replace with: At the manufacturer's option, marketable emission reduction credits for NOx plus NMHC, for use in emission reduction credit programs other than ABT, may be generated based upon engine certification to the optional reduced-emission NOx plus NMHC certification standards of ' section I.11.B.2 of these test procedures except that medium-duty engines certified under title 13, CCR, §1956.8(h) for use in vehicles of more than 8,500 pounds through 14,000 pounds gross vehicle weight rating may not be used as the basis for generating marketable emission reduction credits. Use of any marketable emission reduction credits generated must meet the requirements of the individual emission reduction credit program where the credits will be applied.

- (1) For those engine sales used to generate ABT credits, the manufacturer shall report engine sales in the category "ABT-only credits." For those engine sales certified to generate marketable emission reduction credits for NOx, the manufacturer shall report engine sales in the category "non-manufacturer-owned credits."

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<sup>1</sup> Seven of the largest heavy-duty diesel engine manufacturers will be implementing measures to reduce emissions beginning October 1, 2002, to meet the requirements of the Heavy-Duty Diesel Engines Settlement Agreements reached with the ARB. The Heavy-Duty Diesel Engine Settlements were agreements reached in response to lawsuits brought by the United States Environmental Protection Agency and violations alleged by the ARB pertaining to excess in-use emissions caused by the use of defeat devices and unacceptable algorithms. Navistar signed its Settlement Agreement on October 22, 1998. Cummins, Detroit Diesel Corporation, Caterpillar, Volvo, Mack and Renault signed their Settlement Agreements on December 15, 1998.

- (i) For engine sales reported as "ABT-only credits," the credits generated must be used solely in the ABT program described in this section.
  - (ii) The engine manufacturer may declare a portion of engine sales "non-manufacturer-owned credits" and any marketable NOx credits generated based upon such sales would belong to the engine purchaser. For ABT, the manufacturer may not generate any credits for the engine sales reported as "non-manufacturer-owned credits."
  - (2) Only manufacturer-owned credits resulting from engine sales reported as "ABT-only credits" shall be used in the averaging, trading, and banking provisions described in this section.
  - (3) Credits shall not be double-counted. Credits used in the ABT program may not be provided to an engine purchaser for use in another program.
  - (4) Manufacturers shall determine and state the number of engines sold as "ABT-only credits" and "non-manufacturer-owned credits" in the end-of-model year reports required under ' 86.001-23.
- 1.18 Subparagraphs (k) and (l). [No change.]

2. **§86.007-15.** January 18, 2001. Amend as follows:

- 2.1 Introductory paragraph; subparagraphs (a) through (m)(9). [No change.]
- 2.2 Amend subparagraph (m)(9)(i) through (iv) as follows:
  - (i) Manufacturers certifying a split diesel engine family to both the pre-2007 (phased-out) and post-2007 (phased-in) emission standards with equally sized subfamilies may exclude the engines within that split family from end-of-year NOx (or NOx+NMHC) ABT calculations, provided that neither subfamily generates credits for use by other engine families, or uses banked credits, or uses averaging credits from other engine families. All of the engines in that split family must be excluded from the phase-in calculations of Sec. 86.007-11(g)(1) (both from the number of engines complying with the standards being phased-in and from the total number of U.S.-directed production engines.)
  - (ii) [n/a; Otto-cycle]
  - (iii) [No change.]
  - (iv) Notwithstanding the provisions of paragraph (m)(9)(iii) of this section, for split families, the NOx FEL shall be used to determine applicability of the provisions of §86.1360-2007 B.1.2 and B.1.3. and Sec.1370-2007 A.1.4.1(iii) and A.1.4.1(iv), as modified by these test procedures.
- 2.3 Subparagraph (m)(10). [No change.]



**B. California provisions**

1. For medium-duty diesel-cycle engines certified under' title 13, CCR §1956.8(h):

(a) Credits may be generated by an alternative mechanism proposed by the engine manufacturer and approved by the Executive Officer of the ARB. The alternative credit-generating mechanism shall not include any attribute expressly prohibited under the federal ABT program, such as cross-class or cross-fuel trading.

(b) Manufacturers must annually submit a proposed plan for generating credits to the Executive Officer of the ARB and have it approved prior to sale of engines of that model year in California.

16. Prohibition of defeat devices. §86.000-16 January 18, 2001 [No change.]

17. On-board diagnostics. §86.099-17; 86.005-17; [Delete replace with: All heavy-duty diesel cycle engines used in vehicles up to 14,000 pounds GVW must have an on-board diagnostic system as required in title 13, CCR §1968 et seq, as applicable.]

18. §86.xxx-18. [Reserved.]

19. §86.xxx-19. [Reserved.]

20. Incomplete vehicles, classification. §86.085-20 January 12, 1983. [No change.]

21. Application for certification. [§86.xxx-21]

**A. Federal provisions.**

1. **§86.004-21** October 6, 2000. Amend as follows:

1.1 Subparagraphs (a) through (l). [No change.]

1.2 Delete subparagraph (m).

1.2 Subparagraph (n). [No change.]

2. **§86.007-21** October 6, 2000. Amend as follows:

2.1 Subparagraphs (a) through (l). [No change.]

2.2 Delete subparagraph (m).

2.3 Subparagraph (n). [No change.]

2.4 Amend subparagraph (o) as follows: For 2005 and subsequent model year diesel heavy-duty engines, the manufacturer must provide the following additional information pertaining to the supplemental steady-state test conducted under § 86.1360-2007:

2.4.1 Amend subparagraph (o)(1) as follows: Weighted brake-specific emissions data (i.e., in units of g/bhp-hr), calculated according to § 86.1360-2007(e)(5) and (6), for all pollutants for which an emission standard is

established in § 86.004-11(a);

2.4.2 Subparagraphs (o)(2) through (o)(6). [No change.]

2.4.3 Amend subparagraph (o)(7) as follows: A statement that the engines will comply with the weighted average emissions cap and interpolated values comply with the emission testing caps specified in §86.1360-2007B.1 for the useful life of the engine. The manufacturer also must maintain records at the manufacturer's facility which contain a detailed description of all test data, engineering analyses, and other information which provides the basis for this statement, where such information exists. The manufacturer must provide such information to the Executive Officer upon request.

2.5 Amend subparagraph (p) as follows:

2.5.1. (1) The manufacturer must provide a statement in the application for certification that the diesel heavy-duty engine for which certification is being requested will comply with the applicable Not-To-Exceed Limits specified in §86.1370-2007A.1.4 when operated under all conditions which may reasonably be expected to be encountered in normal vehicle operation and use. The manufacturer also must maintain records at the manufacturer's facility which contain all test data, engineering analyses, and other information which provides the basis for this statement, where such information exists. The manufacturer must provide such information to the Executive Officer upon request.

2.5.2. Subparagraph (p)(2). [No change.]

2.5.3. Amend subparagraph (p)(3) as follows: For each engine model and/or horsepower rating within an engine family for which a manufacturer is applying for a NTE deficiency(ies) under the provisions of §86.1370-2007B.3, the manufacturer's application for an NTE deficiency(ies) must include a complete description of the deficiency, including but not limited to: the specific description of the deficiency; what pollutant the deficiency is being applied for, all engineering efforts the manufacturer has made to overcome the deficiency, what specific operating conditions the deficiency is being requested for (i.e., temperature ranges, humidity ranges, altitude ranges, etc.), a full description of the auxiliary emission control device(s) which will be used to maintain emissions to the lowest practical level; and what the lowest practical emission level will be.

## **B. California provisions**

1. For 2004 and subsequent model-year medium-duty ultra-low emission and super-ultra-low emission vehicles and engines not powered exclusively by diesel fuel, the manufacturer shall submit projected California sales and fuel economy data two years prior to certification.

22. Approval of application for certification; test fleet selections; determinations of parameters subject to adjustment for certification and Selective Enforcement Audit, adequacy of limits, and physically adjustable ranges. [§86.001-22]  
April 6, 1994. [No change.]

23. Required data. [§86.xxx-23]

**A. Federal provisions.**

1. **§86.098-23.** October 21, 1997

1.1 Subparagraphs (a) through (b)(1)(i) [No change.]

1.2 Add the following sentence to subparagraph (b)(1)(ii): The data derived from testing to determine the exhaust emission deterioration factors shall be submitted to the Executive Officer for review. If the durability test method is accepted by EPA, it shall also be accepted by ARB, subject to the following condition. If, after certification for the first model year in which the method is used, the Executive Officer determines that a manufacturer's durability test procedures do not conform with good engineering practices, the Executive Officer may require changes to that manufacturer's durability test procedures for subsequent model years. The manufacturer's revised durability test procedures shall be submitted to the Executive Officer for review and approval.

1.3 Subparagraphs (b)(2) through (h)(2) [No change.]

1.4 Amend subparagraph (h)(3) as follows:

(h)(3)(i) These reports shall be submitted within 90 days of the end of the model year to: Chief, Mobile Source Operations Division, California Air Resources Board, 9528 Telstar Avenue, El Monte, California 91731.

1.5 Subparagraphs (h)(3)(ii) through (m) [No change.]

2. **§86.001-23** October 21, 1997 [No change, except that the amendments indicated for §86.098-23 above still apply.]

3. **§86.007-23** January 18, 2001 [No change, except that the amendments indicated for §86.098-23 above still apply.]

24. Test vehicles and engines. §86.xxx-24

**A. Federal provisions.**

1. **§86.001-24.** October 22, 1996. [No change except that the reference in subparagraph (e)(2) to 10,000 light-duty vehicles, light-duty trucks, heavy-duty vehicles and heavy-duty engines shall mean 4,500 units based on the average number of vehicles or engines sold for the three previous consecutive model years for which a manufacturer seeks certification in California.]

25. Maintenance. §86.xxx-25

**A. Federal provisions.**

1. **§86.004-25.** October 21, 1997.

1.1 Subparagraphs (a) through (b)(6)(ii). [No change.]

1.2 Add the following phrase to the last sentence of subparagraph (b)(6)(iii): ... or California Vehicle Code ' 27156, et seq.

1.3 Subparagraphs (b)(7)(i) and (b)(7)(ii). [No change.]

1.4 Add the following sentence to subparagraph (b)(7)(iii): The Executive Officer may also provide the manufacturer a hearing in accordance with title 17, CCR, § 60040, et seq., with respect to such issue.

2. **§86.007-25.** January 18, 2001. [No change except that the amendments indicated for §86.004-25 above still apply.]

26. Mileage and service accumulation; emission measurements. §86.004-26  
October 6, 2000. [No change.]

27. Special test procedures. §86.090-27 April 11, 1989. [No change.]

28. Compliance with emission standards. §86.xxx-28 January 18, 2001.

**A. Federal provisions.**

1. **§86.004-28.** January 18, 2001. Amend as follows:

1.1 Subparagraphs (a) through (c)(4)(i) [No change.]

1.2 Amend subparagraph (c)(4)(ii) as follows: [No change, except that diesel-cycle smoke testing shall only apply to petroleum-fueled diesel-cycle engines.]

1.3. Subparagraph (c)(4)(iii)(A) [n/a; Otto-cycle engines.]

1.4 Subparagraph (c)(4)(iii)(B): [No change, except that the exhaust emission results for formaldehyde exhaust emission results for methanol-fueled engines and vehicles, ultra-low emission vehicles and super-ultra-low emission vehicles shall also be adjusted by the appropriate deterioration factor (through addition or multiplication as the case may be.)

1.5 Amend subparagraph (c)(4)(iii)(B)(3) as follows: For petroleum-fueled diesel cycle HDEs only: [No change to remainder of paragraph.]

1.6 Subparagraphs (c)(iv) through (i). [No change.]

29. Testing by the Administrator. §86.091-29. March 24, 1993. [No change.]

30. Certification. §86.xxx-30

**A. Federal provisions**

1. **§86.004-30.** October 21, 1997. Amend as follows:

1.1 Subparagraphs (a) through (a)(2). [No change.]

1.2 Add the following sentence to subparagraph (a)(3)(i). For heavy-duty engines certified under the provisions of ' section I.11.B.4 of these test procedures two certificates will be issued, one for each fueling mode. [No change to remainder of paragraph.]

1.3 Subparagraphs (a)(3)(ii) through (b)(2). [No change.]

1.4 Subparagraph (b)(3). Add the following sentence: If, after a review of the request and supporting data, the Executive Officer finds that the request raises a substantial factual issue, he shall provide the manufacturer a hearing in accordance with title 17, CCR, §' 60040, et seq., with respect to such issue.

1.5 Subparagraph (b)(4). [No change.]

1.6 Subparagraph (b)(4)(i). Add the following phrase at the beginning of the paragraph: Request a hearing under title 17, CCR, §'60040, et seq.; or...

1.7 Subparagraph (b)(4)(ii) through (b)(5). No change.

1.8 Subparagraph (b)(5)(i). Add the following phrase at the beginning of the paragraph: Request a hearing under title 17, CCR, §'60040, et seq.; or...

1.9 Subparagraph (b)(5)(ii) through (c)(5). [No change.]

1.10 Subparagraph (c)(5)(i). Add the following phrase at the beginning of the paragraph: Be made only after the manufacturer concerned has been offered an opportunity for a hearing conducted in accordance with title 17, CCR, §'60040, et seq. hereof; and ...

1.11 Subparagraph (c)(5)(ii). [No change.]

1.12 Subparagraph (c)(6). Add the following sentence: The manufacturer may request in the form and manner specified in paragraph (b)(3) of this section that any determination made by the Executive Officer under paragraph (c)(1) of this section to withhold or deny certification be reviewed in a hearing conducted in accordance with title 17, CCR, §' 60040, et seq. If the Executive Officer finds, after a review of the request and supporting data, that the request raises a substantial factual issue, he will grant the request with respect to such issue.

1.13 Subparagraphs (d) through (e). [No change.]

1.14 Delete subparagraph (f) and replace with the following: All medium-duty diesel cycle engines used in vehicles up to 14,000 pounds GVW must have an on-board diagnostic system as required in title 13, CCR §1968 et seq, as applicable.

31. Separate certification. §86.079-31 September 8, 1977. [No change.]

32. Addition of a vehicle or engine after certification. §86.079-32 September 8, 1977. [No change.]

33. Changes to a vehicle or engine covered by certification. §86.079-33 September 8, 1977. [No change.]

34. Alternative procedure for notification of additions and changes. §86.082-34 November 2, 1982. [No change.]

35. Labeling. §86.xxx-35,

**A. Federal Provisions.**

1. **§86.001-35** January 18, 2001.

1.1 Add the following sentence to the introductory paragraph: The labeling requirements of this section shall apply to all new motor vehicle engines certified according to the provisions of California Health and Safety Code Section 43100.

1.2 Subparagraphs (a)(1) through (a)(3)(iii)(G). [No change.]

1.3 Add the following language to subparagraph (a)(3)(iii)(H).

1.3.1 For 2004 through 2006 model year heavy heavy-duty diesel-fueled, dual-fuel, and bi-fuel engines to be used in urban buses that are certified to the optional reduced emission standards and are sold to any transit agency exempted under paragraphs (c)(8) and (d)(7), title 13, CCR, §1956.2 from the requirements of paragraphs (c)(5) and (d)(4), title 13, CCR §956.2.

“This engine conforms to California regulations applicable to XXX model year new urban bus or heavy-duty diesel engines and is certified to a NOx plus NMHC optional reduced-emission standards of XXX g/bhp-hr (for optional reduced-emission standards specify between 0.3 and 1.8, inclusive, at 0.3 b/bhp-hr increments, and a particulate matter standards of 0.01 g/bhp-hr).”

1.3.2 For all other 2004 through 2006 model year heavy-duty diesel cycle engines, including those used in urban buses, that are certified to the optional reduced-emission standards, the label shall contain the following statement:

“This engine conforms to California regulations applicable to XXX model year new (specify urban bus or heavy-duty diesel) engines and is certified to a NOx plus NMHC optional reduced-emission standards of XXX g/bhp-hr (for optional reduced-emission standards specify between 0.3 and 1.8, inclusive, at 0.3 b/bhp-hr increments, and a particulate matter standard of 0.03 g/bhp-hr, 0.02 g/bhp-hr, or 0.01 g/bhp-hr).”

1.4 Subparagraphs (a)(3)(I) through (i). [No change.]

2. **§86.007-35.** January 18, 2001.

2.1 Subparagraphs (a) through (i). [No change except that the amendments set forth in §86.001-35 apply.]

## **B. California provisions.**

1. For 2004 and later model year heavy-duty diesel engines certified under the requirements of title 13, CCR, §1956.8(a)(3), the statement of compliance requirements of this subsection shall be repeated for each of the two fueling modes of operation. Appended to the statement for the lower emitting fueling mode of operation shall be the following sentence:

“This certification is valid only while operating on \_\_\_\_ (indicate the fuel or fuel combination under which this mode of operation was certified) fuel.

Operation using any other fueling mode will result in significant increases in exhaust emissions and significantly reduce engine performance.”

2. Manufacturers may elect to use a supplemental label in addition to the original label if there is not sufficient space to include all the required information. The supplemental label must conform to all specifications as the original label. In the case that a supplemental label is used, the original label shall be numbered “1 of 2” and the supplemental label shall be numbered “2 of 2.”

3. Statements shall not be used on labels placed on engines that, in fact, do not comply with all applicable California regulations.

36. Submission of vehicle identification numbers. §86.079-36 [n/a]

37. Production vehicles and engines. §86.085-37 June 6, 1997. [No change.]

38. Maintenance instructions. §86.xxx-38

**A. Federal provisions**

1. **§86.004-38** October 21, 1997.

1.1 Subparagraphs (a) through (f). [No change.]

1.2 Amend subparagraph (g)(1) as follows: (g) Emission control diagnostic service information:

(1) Manufacturers shall furnish or cause to be furnished to any person engaged in the repairing or servicing of motor vehicles or motor vehicle engines, or the Administrator upon request, any and all information needed to make use of the on-board diagnostic system and such other information, including instructions for making emission-related diagnosis and repairs, including, but not limited to, service manuals, technical service bulletins, recall service information, data stream information, bi-directional control information, and training information, unless such information is protected by section 208(c) of the Act or California Government Code Section 6250, as a trade secret. No such information may be withheld under section 208(c) of the Act or California Government Code Section 6250 if that information is provided (directly or indirectly) by the manufacturer to franchised dealers or other persons engaged in the repair, diagnosing, or servicing of motor vehicles or motor vehicle engines.

1.3 Subparagraphs (g)(2) through (h). [No change.]

2. **§86.007-38** January 18, 2001.

2.1 Subparagraphs (a) through (h) [No change, except as amended in §86.004-38, above.]

2.2 Amend subparagraph (i) as follows: For each new diesel-fueled engine subject to the standards prescribed in title 13, CCR §1956.8(a),

§1956.8(h), and Sec. 86.007-11, as applicable, the manufacturer shall furnish or cause to be furnished to the ultimate purchaser a statement that "This engine must be operated only with low sulfur diesel fuel (that is, diesel fuel meeting ARB specifications for highway diesel fuel, including a 15 ppm sulfur cap)."

39. Submission of maintenance instructions. §86.079-39 September 8, 1977. [No change.]

40. Heavy-duty engine rebuilding practices. §86.xxx-40

**A. Federal Provisions.**

1. **§86.004-40** October 21, 1997.

1.1 Add the following sentence to the introductory paragraph: Any deviation from the provisions contained in this section is also a prohibited act under California Vehicle Code ' section 27156, et seq.

1.2 Subparagraphs (a) through (e). [No change.]



## **PART II TEST PROCEDURES**

### **Subpart I - Emission Regulations for New Diesel-Fueled Heavy-Duty Engines; Smoke Exhaust Test Procedure**

86.884-1 General Applicability. September 21, 1994.

The provisions of this subpart are applicable to new petroleum-fueled diesel heavy-duty engines beginning with the 1984 model year.

The provisions of this subpart are not applicable to new heavy-duty diesel gaseous-fuel engines and those gaseous-fuel engines derived from diesel engines, except dual-fuel and multi-fuel engines which use petroleum fuel.

86.884-2 Definitions. November 16, 1983.

86.884-3 Abbreviations. November 16, 1983.

86.884-4 Section numbering. September 21, 1994.

86.884-5 Test Procedures. April 11, 1989.

86.884-6 Fuel specifications. April 11, 1989.

86.884-7 Dynamometer operation cycle for smoke emission tests. September 5, 1997.

86.884-8 Dynamometer and engine equipment. September 5, 1997.

86.884-9 Smoke measurement system. September 5, 1997.

86.884-10 Information. September 5, 1997.

86.884-11 Instrument checks. December 11, 1984.

86.884-12 Test run. December 16, 1987.

86.884-13 Data analysis. September 5, 1997.

86.884-14 Calculations. September 5, 1997.

## Subpart N - Emission Regulations for New Otto-Cycle and Diesel Heavy-Duty Engines; Gaseous and Particulate Exhaust Test Procedures

- 86.1301-90 Scope; applicability. April 11, 1989.
- 86.1302-84 Definitions. November 16, 1983.
- 86.1303-84 Abbreviations. November 16, 1983.
- 86.1304-90 Section numbering; construction. October 6, 2000.
- 86.1305-04 Introduction; structure of subpart. October 6, 2000.
- 86.1306-96 Equipment required and specifications; overview. September 21, 1994.
- 86.1306-2007 Equipment required and specifications; overview. January 18, 2001.
- 86.1308-84 Dynamometer and engine equipment specifications. December 10, 1987.
- 86.1309-90 Exhaust gas sampling system; Otto-cycle and non-petroleum fueled engines. January 18, 2001.

Amend subparagraph (a)(3) as follows: For methanol-fueled engines, the sample lines for the methanol and formaldehyde samples are heated to  $235^{\circ} \pm 15^{\circ}\text{F}$  ( $113^{\circ} \pm 8^{\circ}\text{C}$ ).

- 86.1310-90 Exhaust gas sampling and analytical system; diesel engines. September 5, 1997.
- 86.1310-2007 Exhaust gas sampling and analytical system for gaseous emissions from heavy-duty diesel-fueled engines and particulate emissions from all engines. January 18, 2001 [No change.]
- 86.1311-94 Exhaust gas analytical system, CVS bag sample. October 21, 1997.
- 86.1312-88 Weighing chamber and microgram balance specifications. September 5, 1997.
- 86.1312-2007 Filter stabilization and microbalance workstation environmental conditions, microbalance specifications, and particulate matter filter handling and weighing procedures. January 18, 2001.
- 86.1313-94 Fuel specifications. September 5, 1997.

Amend as follows:

1. Subparagraph (a) Gasoline fuel [n/a]
2. Subparagraph (b) Petroleum diesel test fuel. [For guidance see §86.1313-98.]
3. Subparagraph (c) Methanol fuel. Amend ' 86.1313-94(c) as follows:  
Delete subparagraphs (c)(1) and (c)(2); replace with:
  - 3.1 (1) **Exhaust emission test fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust and

evaporative emission testing shall meet the specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol) as modified by the following:

Specification	Limit
M-100 Fuel Methanol	
Methanol	98.0 ± 0.5 vol. percent
<b>Ethanol</b>	1.0 vol. Percent (max.)
Petroleum fuel meeting the specifications of 40 CFR 86.1313-98	1.0 ± 0.1 vol. percent
E-100 Fuel Ethanol	
Ethanol	98.0 ± 0.5 vol. percent
<b>Methanol</b>	1.0 vol. Percent (max.)
Petroleum fuel meeting the specifications of 40 CFR 86.1313-98	1.0 ± 0.1 vol. percent

- 3.2 (2) **Mileage accumulation fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for service accumulation shall meet the applicable specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol).

- 3.3 (3) [No change.]

- 3.4 Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

4. Subparagraph (d) Mixtures of petroleum and methanol fuels for flexible fuel vehicles. Amend 86.1313-94(d) as follows: Delete subparagraphs (d)(1) and (d)(2); replace with:

- 4.1 (1) **Exhaust emission test fuel for emission-data and durability-data vehicles.** For Otto-cycle or diesel alcohol vehicles and hybrid electric

vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust emission testing shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) as modified by the following:

Specification	Limit
<b>M-85 Fuel Methanol</b>	
Petroleum fuel meeting the specifications of 40 CFR §86.1313-98	13-16 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.
<b>E-85 Fuel Ethanol</b>	
Petroleum fuel meeting the specifications of 40 CFR §86.1313-98	15-21 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.

4.2 (2) **Mileage accumulation fuel.** For flexible fuel Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles that use Otto-cycle or diesel alcohol engines, petroleum fuel shall meet the applicable specifications in 86.1313-98(a) or (b), as modified by these test procedures, and methanol or ethanol fuel shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specification for E-85 Fuel Ethanol). Mileage accumulation procedures shall be subject to the requirements set forth in 40 CFR 86.001-26 and 86.1831-01(a) and (b) and are subject to the prior approval of the Executive Officer. A manufacturer shall consider expected customer fuel usage as well as emissions deterioration when developing its durability demonstration.

4.3 (3) [No change.]

4.4 **Evaporative emission test fuel for emission-data and durability-data vehicles.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, a blend of methanol or ethanol fuel used for evaporative emission testing shall meet the applicable

specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) and gasoline meeting the specifications of 86.1313-94 (a)(1), as modified by these test procedures, such that the final blend is composed of either 35 volume percent methanol (" 1.0 volume percent of total blend) for methanol-fueled vehicles or 10 volume percent ethanol (" 1.0 volume percent of total blend) for ethanol-fueled vehicles. Alternative alcohol-gasoline blends may be used in place of M35 or E10 if demonstrated to result in equivalent or higher evaporative emissions, subject to prior approval of the Executive Officer.

4.5 **Additive requirements.** Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

5. Subparagraph (e) Natural gas fuel. Amend ' 86.1313-94(e) as follows: Delete subparagraphs (e)(1), (e)(2) and (e)(3); Replace with:

5.1 (1) **Exhaust emission test fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in section 2292.5, title 13, CCR, (Specifications for Compressed Natural Gas) as modified by the following:

Specification	Limit
<b>Compressed Natural Gas Certification Test Fuel</b>	
Methane	90.0 ± 1.0 mole percent
Ethane	4.0 ± 0.5 mole percent
C <sub>3</sub> and higher hydrocarbon content	2.0 ± 0.3 mole percent
Oxygen	0.5 mole percent maximum
Inert gases (CO <sub>2</sub> + N <sub>2</sub> )	3.5 ± 0.5 vol. percent

5.2 (2) **Mileage accumulation fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for service accumulation shall meet the specifications listed in section 2292.5, title 13, CCR, (Specifications for Compressed Natural Gas).

5.3 (3) Delete.

5.4 (4) [No change.]

6. Amend 86.1313-94(f) as follows: Delete subparagraphs (f)(1) and (f)(2); Replace with:

6.1 (1) **Evaporative and exhaust emission test fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in section 2292.6, title 13, CCR, (Specifications for Liquefied Petroleum Gas) as modified by the following:

Specification	Limit
<b>Liquefied Petroleum Gas Certification Test Fuel</b>	
Propane	93.5 ± 1.0 volume percent
Propene	3.8 ± 0.5 volume percent
Butane and heavier components	1.9 ± 0.3 volume percent

6.2 (2) **Mileage accumulation fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for service accumulation shall meet the specifications listed in section 2292.6, title 13, CCR, (Specifications for Liquefied Petroleum Gas).

6.3 (3) [No change.]

7. §86.1313-94(g) [No change.]

8. Add the following California only requirement: Identification of New Clean Fuels to be Used in Certification Testing

Any person may petition the state board to establish by regulation certification testing specifications for a new clean fuel for which specifications for the new clean fuel are not specifically set forth in paragraph ' 86.1313-98 as amended herein. Prior to adopting such specifications, the state board shall consider the relative cost-effectiveness of use of the fuel in reducing emissions compared to the use of other fuels. Whenever the state board adopts specifications for a new clean fuel for certification testing, it shall also establish by regulation specifications for the fuel as it is sold commercially to the public.

- (a) If the proposed new clean fuel may be used to fuel existing motor vehicles, the state board shall not establish certification specifications for the fuel unless the petitioner has demonstrated that:
  - (1) Use of the new clean fuel in such existing motor vehicles would not increase emissions of NMHC, NOx, CO, and the potential risk associated with toxic air contaminants, as determined pursuant to the procedures set forth in the "California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels," as adopted September 17, 1993. In the case of fuel-flexible vehicles or dual-fuel vehicles that were not certified on the new clean fuel but are capable of being operated on it, emissions during operation with the new clean fuel shall not increase compared to emissions during vehicle operation on gasoline.
  - (2) Use of the new clean fuel in such existing motor vehicles would not result in increased deterioration of the vehicle and would not void the warranties of any such vehicles.
- (b) Whenever the state board designates a new clean fuel pursuant to this section, the state board shall also establish by regulation required specifications for the new clean fuel sold commercially in California.

86.1313-98 Fuel specifications. February 18, 2000.

- 1. Subparagraph (a) [n/a]
- 2. Amend subparagraph (b) Diesel test fuel as follows:
  - 2.1 Subparagraph (b)(1) [No change.]
  - 2.2 Add the following language to subparagraph (b)(2): For 2004 through 2005 model-year medium-duty diesel-fueled engines, the petroleum fuel used in exhaust emissions testing may meet the specifications listed below, or substantially equivalent specifications approved by the Executive Officer, as an option to the specifications in Table N90-2. Where a manufacturer elects pursuant to this subparagraph to conduct exhaust emission testing using the specifications in Table N98-2, or the specifications listed below, the Executive Officer shall conduct exhaust emission testing with the diesel fuel meeting the specifications elected by the manufacturer. The manufacturer shall submit evidence to the Executive Officer demonstrating to the Executive Officer's satisfaction that the test fuel will be the predominant in-use fuel. Such evidence could include such things as copies of signed contracts from customers indicating the intent to purchase and use the test fuel as the primary fuel for use in the engines or other evidence acceptable to the Executive Officer.

Fuel Property	Limit	Test Method <sup>a</sup>
Natural Cetane Number	47-55	D613-86
Distillation Range, °F		Title 13 CCR, §2282(g)(3)
IBP	340-420	
10% point	400-490	
50% point	470-560	
90% point	550-610	
EP	580-660	
API Gravity, degrees	33-39	D287-82
Total Sulfur, wt. %	0.01-0.05	Title 13 CCR, §2282(g)(3)
Nitrogen Content, ppmw	100-500	Title 13 CCR, §2282(g)(3)
Total Aromatic Hydrocarbons, vol.%	8-12	Title 13 CCR, §2282(g)(3)
Polycyclic Aromatic Hydrocarbons, wt. % (max.)	1.4	Title 13 CCR, §2282(g)(3)
Flashpoint, °F (max)	130	D 93-80
Viscosity @ 40°F, centistokes	2.0-4.1	D 445-83

<sup>a</sup> ASTM specifications unless otherwise noted. A reference to a subsection of Title 13, CCR, §2282 means the test method identified in that subsection for the particular property. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results of the specified method.

2.3 (3) Add the following language to subparagraph (b)(3): For 2004 and 2005 model-year medium-duty diesel-fueled engines, diesel fuel representative of commercial diesel fuel which will be generally available through retail outlets shall be used in service accumulation.

3. Subparagraphs (c), (d) and (e). [For guidance see §86.1313-94, above.]

- 86.1313-04 Fuel specifications. January 18, 2001. [n/a]
- 86.1313-2007 Fuel specifications. January 18, 2001. [No change.]
- 86.1314-94 Analytical gases. June 30, 1995.
- 86.1316-94 Calibration; frequency and overview. September 5, 1997.
- 86.1318-84 Engine dynamometer system calibrations. December 10, 1984.
- 86.1319-90 CVS calibration. January 18, 2001.



- 86.1320-90 Gas meter or flow instrumentation calibration; particulate, methanol, and formaldehyde measurement. April 11, 1989.
- 86.1321-94 Hydrocarbon analyzer calibration. September 5, 1997.
- 86.1322-84 Carbon monoxide analyzer calibration. September 5, 1997.
- 86.1323-84 Oxides of nitrogen analyzer calibration. September 5, 1997.
- 86.1323-2007 Oxides of nitrogen analyzer calibration. January 18, 2001
- 86.1324-84 Carbon dioxide analyzer calibration. September 5, 1997.
- 86.1325-94 Methane analyzer calibration. September 5, 1997.
- 86.1326-90 Calibration of other equipment. April 11, 1989.
- 86.1327-98 Engine dynamometer test procedures; overview. September 5, 1997.
- 86.1330-90 Test sequence, general requirements. January 18, 2001.
- 86.1332-90 Engine mapping procedures. September 21, 1994.
- 86.1333-90 Transient test cycle generation. May 4, 1998.
- 86.1334-84 Pre-test engine and dynamometer preparation. January 18, 2001.
- 86.1335-90 Optional forced cool-down procedure. September 5, 1997.
- 86.1336-84 Engine starting and restarting. September 21, 1994.
- 86.1337-90 Engine dynamometer test run. April 11, 1989.
- 86.1337-2007 Engine dynamometer test run. January 18, 2001.
- 86.1338-84 Emission measurement accuracy. September 5, 1997.
- 86.1338-2007 Emission measurement accuracy. January 18, 2001.
- 86.1339-90 Particulate filter handling and weighing. January 18, 2001.
- 86.1340-94 Exhaust sample analysis. June 30, 1995.
- 86.1341-98 Test cycle validation criteria. September 5, 1997.
- 86.1342-94 Calculations; exhaust emissions. September 5, 1997.

\* \* \* \* \*

Amend subparagraph (d) Meaning of symbols as follows:

\* \* \* \* \*

Delete subparagraph (d)(1)(ii)(D) and replace with: If gaseous fuels are being used, 18.64 g/ft<sup>3</sup> for natural gas and 17.28 g/ft<sup>3</sup> for liquefied petroleum gas, assuming an average carbon to hydrogen ratio of 1:3.803 for natural gas and 1:2.656 for liquefied petroleum gas, at 68°F and 760 mm Hg pressure. The Executive Officer may approve other density values deemed appropriate by a manufacturer when gaseous fuels are being used.

Amend subparagraph (d)(3)(v)(B) as follows:  $CO_e = [1 - (0.01 + 0.005HCR)CO_{2e} - 0.00323R]CO_{em}$  for methanol fuel, where HCR is hydrogen to carbon ratio as measured for the fuel used. For natural gas and liquefied petroleum gas, HCR is assumed to be 2.656 and 3.802, respectively.

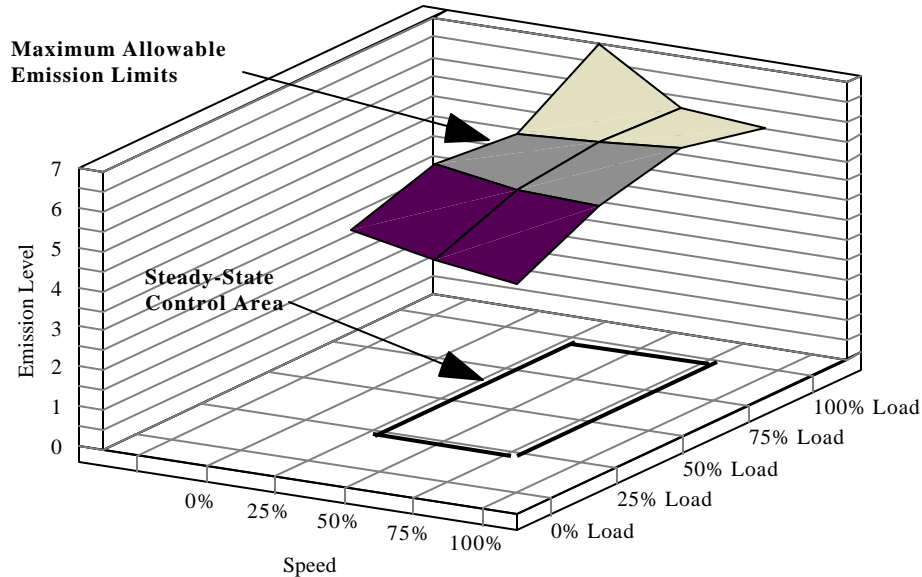
Amend subparagraph (d)(8)(iii) as follows: For petroleum-fueled, gaseous-fueled, and methanol-fueled diesel engines:  $K_H = 1/[1-0.0026(H-75)]$  (or for SI units,  $= 1/[1-0.0182 (H-10.71)]$ ).

- 86.1343-88      Calculations; particulate exhaust emissions (including diesel gaseous-fuel, dual-fuel and multi-fuel engines). September 5, 1997.  
86.1344-94      Required information. October 21, 1997.  
86.1360-2007    Supplemental steady-state test; test cycle and procedures.  
January 18, 2001.

**A. Federal provisions**

1. Introductory paragraph. [No change.]
2. Amend subparagraph (a) as follows: Applicability. This section applies to 2005 and subsequent model year heavy duty diesel engines.
3. Amend subparagraph (b) as follows:
  - 3.1 Subparagraph (b)(1)
    - 3.1.1 (b)(1)(i). Test cycle. [No change.]
    - 3.1.2. Add subparagraph (b)(1)(ii) as follows: For 2007 and subsequent model years, upon Executive Officer approval, the manufacturer may use mode lengths other than those listed in subparagraph (b)(1)(i) of this section.
  - 3.2. Subparagraph (b)(2): [No change.]
4. Amend subparagraph (c) as follows: Determining engine speeds. (1) The engine speeds A, B, and C, referenced in the table in paragraph (b)(1) of this section, and speeds D and E must be determined as follows: [No change to remainder of subparagraph.]
5. Subparagraph (d) Determining the control area. [No change.]
6. Subparagraph (e) Test requirements. [No change.]
7. Amend subparagraph (f) as follows: Maximum allowable emission limits.
  - (1) For gaseous emissions, the 12 non-idle test point results and the four-point linear interpolation procedure specified in paragraph (g) of this section for intermediate conditions, shall define Maximum Allowable Emission Limits for purposes of paragraph B.1 of this section except as modified under paragraph (f)(3) of this section. [No change to remainder of paragraph.]

**Figure 1**  
**Maximum Allowable Emission Limits**  
 Sample - For Illustration Only



(2) If the weighted average emissions, calculated according to paragraph (e)(6) of this section, for any gaseous pollutant is equal to or lower than required by paragraph B.1 of this section, each of the 13 test values for that pollutant shall first be multiplied by the ratio of the applicable emission standard (under paragraph B.1 of this section) to the weighted average emissions value, and then by 1.10 for interpolation allowance, before determining the Maximum Allowable Emission Limits under paragraph (g)(2) of this section.

(3) [No change.]

8. Subparagraph (g) Calculating intermediate test points. [No change.]

9. Subparagraph (h): Test fuel specifications. [No change.]

10. Subparagraph (i) General requirements: [No change.]

## **B. California provisions**

1. **Emission testing caps for the 2005 and subsequent model years.**

1.1 The weighted average exhaust emissions, as determined under paragraph (e)(5) and (6) of this section pertaining to the supplemental steady-state test cycle, for each regulated pollutant shall not exceed 1.0 times the applicable emission standards specified in Part I.11 of these test procedures or FELs specified in §86.007-11(a)(1).

1.2 For engines not having a NO<sub>x</sub> FEL less than 1.5 g/bhp-hr, gaseous exhaust emissions shall not exceed the steady-state interpolated values determined by the Maximum Allowable Emission Limits (for the corresponding speed and load), as determined under subparagraph (g) of this section, when the engine is operated in the steady-state control area defined under subparagraph (d) of this section, during steady-state engine operation.

1.3 For engines with a NO<sub>x</sub> FEL less than 1.5 g/bhp-hr, the Maximum Allowable Emission Limit requirements, as determined under Sec. 86.1360-2007(f), do not apply.

1.4 The emission caps specified in this section shall be rounded to the same number of significant figures as the applicable standards in Part I.11 of these test procedures using ASTM E29-93a.

**2. In-Use Compliance for 2005 and subsequent model year engines.** The procedures for in-use voluntary and influenced recall for heavy-duty diesel engines under this section are described in title 13, CCR §§2111 through 2140, except as modified by this paragraph for 2005 and 2006 model year engines. In evaluating the scope of the affected population for the purposes of this section, there shall be a rebuttable presumption that the affected population is the engine family to which the tested engines belong. No engine may be used to establish the existence of an emissions exceedance if the engine or vehicle in which it was installed was subject to abuse or improper maintenance or operation, or if the engine was improperly installed, and such acts or omissions caused the exceedance.

2.1 For the purposes of this section, an exceedance of the emission testing caps occurs when the average emissions of the test vehicles or engines, pursuant to title 13, CCR §2139, for any pollutant exceed the emission threshold. For the purposes of this section, emission threshold is defined as:

(i) for a test using vehicle test equipment (e.g., an over-the-road mobile monitoring device such as "ROVER", or a chassis dynamometer), the applicable maximum NO<sub>x</sub> emissions limit plus the greater of 0.5 g/bhp-hr or one standard deviation of the data set established pursuant to paragraph B.2.2 of this section; or

(ii) for a test using an engine dynamometer, the applicable maximum NOx emissions limit plus 0.5 g/bhp-hr.

2.2 Where an engine dynamometer or vehicle test shows an apparent exceedance of the emissions threshold, the party conducting the original test shall repeat such test under the same conditions at least nine times. The mean of the tests shall be used for the averaging of the test vehicle emissions in determining compliance.

2.3 If the average emissions of the test vehicles exceed the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results. The manufacturer has the option to submit an influenced recall plan in accordance with title 13, CCR §§ 2113 through 2121 within 45 days or to proceed with performing the engineering analysis and/or conducting further testing in accordance with paragraphs B.2.4 and/or B.2.5 of this section. Upon the completion of testing conducted in paragraph(s) B.2.4 and/or B.2.5 if the test results indicate that the average emissions of the test vehicles exceeds the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results and upon receipt of the notification, the manufacturer shall have 45 days to submit an influenced recall plan in accordance with title 13, CCR §§ 2113 through 2121.

2.4 If the testing conducted under paragraph B.2.1 and title 13, CCR § 2139 was performed using vehicle test equipment, then the engine manufacturer may elect to conduct additional tests of that engine using an engine dynamometer, provided that all environmental and engine operating conditions present during vehicle testing under paragraph B.2.1 and title 13, CCR § 2139 can be reproduced or corrected consistent with paragraph B.2.6 of this section. If the engine manufacturer elects to conduct such additional engine dynamometer tests, it shall provide ARB with at least three business days notice prior to commencement of such testing. If based on such additional tests the engine exceeds the emission threshold, the engine manufacturer may conduct further testing in accordance with paragraph B.2.5 of this section and/or perform an engineering analysis to determine the percentage of the affected population that exceeds the emissions threshold and the emission levels of the exceeding engines. However, the manufacturer may not determine the percentage of the affected population or the emission levels solely on the basis of an engineering analysis unless it demonstrates to the Executive Officer's satisfaction that such analysis alone is sufficient under the circumstances.

2.5 Within 60 days of receiving notice of an exceedance under paragraph B.2.3 of this section, the manufacturer may commence testing of not less than ten additional in-service engines. The manufacturer may conduct these tests

using vehicle testing equipment, or using an engine dynamometer, at the manufacturer's option.

2.6 The testing of additional engines under paragraphs B.2.4 and B.2.5 of this section shall be conducted under conditions that are no less stringent than the initial test in terms of those parameters that may affect the result, and, at the manufacturer's option, may be limited to those emission limits and conditions for which apparent exceedances have been identified. Such parameters typically, but not necessarily, include relevant ambient conditions, operating conditions, service history, and age of the vehicle. Prior to conducting any testing, the manufacturer shall submit a test plan to ARB for its review and approval. Within 30 days following ARB's proposed modifications, the manufacturer shall incorporate the proposed modifications and implement the test plan as approved. Special conditioning of test engines shall not be permitted. Where the manufacturer elects to conduct the additional testing utilizing an engine dynamometer, it shall reproduce relevant engine operating and environmental conditions associated with the initial exceedance, provided, however, that correction factors may be used to reproduce temperature, humidity or altitude conditions that cannot be simulated in the laboratory. Regardless of the testing equipment utilized, the test results shall be adjusted to reflect documented test systems error and/or variability in accordance with good engineering practices.

### **3. Exemptions.**

3.1 The requirements set forth in this section do not apply to "ultra-small volume manufacturers" for model years 2005 and 2006. For the purposes of this section, an "ultra-small volume manufacturer" means any manufacturer with California sales less than or equal to 300 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and heavy-duty engines per model year based on the average number of vehicles and engines sold by the manufacturer in the previous three consecutive model years.

3.2 The requirements set forth in this section do not apply to "urban buses", as defined in title 13, CCR §1956.2, for model years 2005 and 2006.

86.1370-2007 Not-To-Exceed test procedures. January 18, 2001.

#### **A. Federal provisions.**

1. Amend subparagraph (a) as follows: General. The purpose of this test procedure is to measure in-use emissions of 2005 and subsequent model year heavy-duty diesel engines while operating within a broad range of speed and load points (the Not-To-Exceed Control Area) and under conditions which can reasonably be expected to be encountered in normal vehicle operation and use.

Emission results from this test procedure are to be compared to the Not-To-Exceed Limits specified in paragraph (d)(1) of this section. The Not-To-Exceed Limits specified in paragraph (d)(1) of this section do not apply for engine starting conditions specified in subparagraph A.1.7 of this section.

2. Amend subparagraph (b) as follows:

2.1 Introductory paragraph, subparagraphs (b)(1) through (b)(4): [No change.]

2.2 Amend subparagraph (b)(5) as follows: For particulate matter only from 2005 and 2006 model year engines, speed and load points determined by one of the following methods, whichever is applicable, shall be excluded from the Not-To-Exceed Control Area. B and C engine speeds shall be determined according to the provisions of § 86.1360-2007(c): [No change to remainder of paragraph.]

2.3 Amend subparagraphs (b)(6) and (b)(7) as follows: [No change except that these requirements apply for 2007 and subsequent model year engines.]

3. Subparagraph (c) [No change.]

4. Amend subparagraph (d) as follows: Not-to-exceed control area caps.

4.1 Amend subparagraph (d)(1) as follows: (i) The emission caps specified in this section shall be rounded to the same number of significant figures as the applicable standards in Part I.11 of these test procedures using ASTM E29-93a.

(ii) For 2005 and 2006 model year engines, when operated within the Not-To-Exceed Control Area defined in paragraph (b) of this section, diesel engine brake-specific exhaust emissions in grams/bhp-hr (as determined under paragraphs (b) and (c) of this section), for each regulated pollutant, shall not exceed 1.25 times the applicable emission standards specified in Part I.11 of these test procedures during engine and vehicle operation specified in paragraph (e)(1) of this section, except as noted in paragraph (e)(2) of this section, when averaged over any period of time greater than or equal to 30 seconds, except where a longer averaging period is required by paragraph (d)(2) of this section.

(iii) For 2007 and subsequent model year engines having a NO<sub>x</sub> FEL less than 1.50 g/bhp-hr, the brake-specific exhaust NMHC or NO<sub>x</sub> emissions in g/bhp-hr, as determined under Sec. 86.1370-2007

pertaining to the NTE test procedures, shall not exceed 1.5 times the applicable NMHC or NO<sub>x</sub> emission standards or FELs specified in Part I.11 of these test procedures, during engine and vehicle operation specified in subdivisions (b), (e), (f), and B.1 of this section when averaged over any period of time greater than or equal to 30 seconds, except where a longer averaging period is required by paragraph (d)(2) of this section.

(iv) For 2007 and subsequent model year engines not having a NO<sub>x</sub> FEL less than 1.50 g/bhp-hr, the brake-specific NO<sub>x</sub> and NMHC exhaust emissions in g/bhp-hr, as determined under Sec. 86.1370-2007 pertaining to the not-to-exceed test procedures, shall not exceed 1.25 times the applicable emission standards or FELs specified in Part I.11 of these test procedures during engine and vehicle operation specified in paragraphs (b), (e), (f), and (g) of this section when averaged over any period of time greater than or equal to 30 seconds, except where a longer averaging period is required by paragraph (d)(2) of this section.

(v) For 2007 and subsequent model year engines, the brake-specific exhaust PM emissions in g/bhp-hr, as determined under Sec. 86.1370-2007 pertaining to the not-to-exceed test procedures, shall not exceed 1.5 times the applicable PM emission standards or FEL (for FELs above the standard only) specified in Part I.11 of these test procedures, during engine and vehicle operation specified in paragraphs (b), (e), (f), and B.1 of this section when averaged over any period of time greater than or equal to 30 seconds, except where a longer averaging period is required by paragraph (d)(2) of this section.

4.2 Subparagraph (d)(2) [No change.]

4.3 Add the following subparagraph (d)(3): For 2005 and subsequent model year heavy-duty engines, operation within the Not-to-Exceed control area (defined in paragraph (b) of this section) must also comply with the following:

(i) A filter smoke number of 1.0 under steady-state operation, or the following alternate opacity limits:

- (A) A 30 second transient test average opacity limit of 4% for a 5 inch path; and
- (B) A 10 second steady state test average opacity limit of 4% for a 5 inch path.

(ii) The limits set forth in paragraph (d)(3)(i) of this section refer to exhaust smoke emissions generated under the conditions set forth in



paragraphs (b) and (e) of this section and calculated in accordance with the procedures set forth in §86.1372-2007.

5. Amend subparagraph (e) as follows: Ambient corrections.

5.1 Introductory paragraph: [No change.]

5.2 Subparagraph (e)(1) For engines operating within the ambient conditions specified in paragraph B.1.1 of this section. [No change to remainder of paragraph.]

5.3 Amend subparagraph (e)(2) as follows: For engines operating within the ambient conditions specified in paragraph B.1.2 of this section; [No change to remainder of section.]

6. Amend subparagraph (f) as follows: NTE cold temperature operating exclusion. 2007 and subsequent model year engines equipped with exhaust gas recirculation (EGR) whose operation within the NTE control area specified in §86.1370(b) when operating during cold temperature conditions as specified in paragraph (f)(1) of this section are not subject to the NTE emission limits during the specified cold temperature operation conditions. [No change to remainder of section.]

7. Subparagraph (g). NO<sub>x</sub> and NMHC aftertreatment warm-up. [No change.]

**B. California provisions.**

1. Ambient operating regions. For each engine family, the not-to-exceed emission limits must apply during one of the following two ambient operating regions;

1.1 The not-to-exceed emission limits apply for all altitudes less than or equal to 5,500 feet above sea-level, during all ambient conditions (temperature and humidity). Temperature and humidity ranges for which correction factors are allowed are specified in paragraph (e) of this section; or

1.2 The not-to-exceed emission limits apply at all altitudes less than or equal to 5,500 feet above sea-level, for temperatures less than or equal to the temperature determined by the following equation at the specified altitude;

$$T = -0.00254 \times A + 100$$

Where:

T = ambient air temperature in degrees Fahrenheit

A = altitude in feet above sea-level (A is negative for altitudes below sea-level)

Temperature and humidity ranges for which correction factors are allowed are specified in section (e).

2. In-Use Compliance. The procedures for in-use voluntary and influenced recall for heavy-duty diesel engines under this section are described in title 13, CCR §§ 2111 through 2140, except as modified by this paragraph for 2005 and 2006 model year engines. In evaluating the scope of the affected population for the purposes of this section, there shall be a rebuttable presumption that the affected population is the engine family to which the tested engines belong. No engine may be used to establish the existence of an emissions exceedance if the engine or vehicle in which it was installed was subject to abuse or improper maintenance or operation, or if the engine was improperly installed, and such acts or omissions caused the exceedance.

2.1 For the purposes of this section, an exceedance of the emission testing caps occurs when the average emissions of the test vehicles or engines, pursuant to title 13, CCR § 2139, for any pollutant exceed the emission threshold. For the purposes of this section, emission threshold is defined as:

(i) for a test using vehicle test equipment (e.g., an over-the-road mobile monitoring device such as "ROVER", or a chassis dynamometer), the applicable maximum NO<sub>x</sub> emissions limit plus the greater of 0.5 g/bhp-hr or one standard deviation of the data set established pursuant to paragraph B.2(2) of this section; or

(ii) for a test using an engine dynamometer, the applicable maximum NO<sub>x</sub> emissions limit plus 0.5 g/bph-hr.

2.2 Where an engine dynamometer or vehicle test shows an apparent exceedance of the emissions threshold, the party conducting the original test shall repeat such test under the same conditions at least nine times. The mean of the tests shall be used for the averaging of the test vehicle emissions in determining compliance.

2.3 If the average emissions of the test vehicles exceed the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results. The manufacturer has the option to submit an influenced recall plan in accordance with title 13, CCR §§ 2113 through 2121 within 45 days or to proceed with performing the engineering analysis and/or conducting further testing in accordance with paragraphs B.2.4 and/or B.2.5 of this section. Upon the completion of testing conducted in paragraph(s) B.2.2 and/or B.2.5, if the test results indicate that the average emissions of the test vehicles exceeds the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results and upon receipt of the notification, the manufacturer shall have 45 days to submit an influenced recall plan in accordance with title 13, CCR §§ 2113 through 2121.

2.4 If the testing conducted under paragraph B.2.1 and title 13, CCR § 2139 was performed using vehicle test equipment, then the engine manufacturer may elect to conduct additional tests of that engine using an engine dynamometer, provided that all environmental and engine operating conditions

present during vehicle testing under paragraph B.2.1 and title 13, CCR § 2139 can be reproduced or corrected consistent with paragraph B.2.6 of this section. If the engine manufacturer elects to conduct such additional engine dynamometer tests, it shall provide ARB with at least three business days notice prior to commencement of such testing. If based on such additional tests the engine exceeds the emission threshold, the engine manufacturer may conduct further testing in accordance with paragraph B.2.5 of this section and/or perform an engineering analysis to determine the percentage of the affected population that exceeds the emissions threshold and the emission levels of the exceeding engines. However, the manufacturer may not determine the percentage of the affected population or the emission levels solely on the basis of an engineering analysis unless it demonstrates to the Executive Officer's satisfaction that such analysis alone is sufficient under the circumstances.

2.5 Within 60 days of receiving notice of an exceedance under paragraph B.2.3 of this section, the manufacturer may commence testing of not less than ten additional in-service engines. The manufacturer may conduct these tests using vehicle testing equipment, or using an engine dynamometer, at the manufacturer's option.

2.6 The testing of additional engines under paragraphs B.2.4 and B.2.5 of this section shall be conducted under conditions that are no less stringent than the initial test in terms of those parameters that may affect the result, and, at the manufacturer's option, may be limited to those emission limits and conditions for which apparent exceedances have been identified. Such parameters typically, but not necessarily, include relevant ambient conditions, operating conditions, service history, and age of the vehicle. Prior to conducting any testing, the manufacturer shall submit a test plan to ARB for its review and approval. Within 30 days following ARB's proposed modifications, if any, the manufacturer shall incorporate the proposed modifications and implement the test plan as approved. Special conditioning of test engines shall not be permitted. Where the manufacturer elects to conduct the additional testing utilizing an engine dynamometer, it shall reproduce relevant engine operating and environmental conditions associated with the initial exceedance, provided, however, that correction factors may be used to reproduce temperature, humidity or altitude conditions that cannot be simulated in the laboratory. Regardless of the testing equipment utilized, the test results shall be adjusted to reflect documented test systems error and/or variability in accordance with good engineering practices.

### 3. Deficiencies for NTE requirements.

3.1 For model years 2005 through 2009, upon application by the manufacturer, the Executive Officer may accept a HDDE as compliant with the NTE requirements even though specific requirements are not fully met. Such compliances without meeting specific requirements, or deficiencies, will be granted only if compliance would be infeasible or unreasonable considering

such factors as, but not limited to: technical feasibility of the given hardware and lead time and production cycles including phase-in or phase-out of engines or vehicle designs and programmed upgrades of computers. Deficiencies will be approved on a engine model and/or horsepower rating basis within an engine family, and each approval is applicable for a single model year. A manufacturer's application must include a description of the auxiliary emission control device(s) which will be used to maintain emissions to the lowest practical level, considering the deficiency being requested, if applicable. An application for a deficiency must be made during the certification process; no deficiency will be granted to retroactively cover engines already certified.

3.2 Unmet requirements should not be carried over from the previous model year except where unreasonable hardware or software modifications would be necessary to correct the deficiency, and the manufacturer has demonstrated an acceptable level of effort toward compliance as determined by the Executive Officer. The NTE deficiency should only be seen as an allowance for minor deviations from the NTE requirements. The NTE deficiency provisions allow a manufacturer to apply for relief from the NTE emission requirements under limited conditions. ARB expects that manufacturers should have the necessary functioning emission control hardware in place to comply with the NTE.

3.3 For model years 2010 through 2013, the Executive Officer may allow up to three deficiencies per engine family. The provisions of §86.007-11 (a)(4)(iv)(A) and §86.007-11 (B) apply for deficiencies allowed by §86.007-11 (a)(4)(iv)(C). In determining whether to allow the additional deficiencies, the Executive Officer may consider any relevant factors, including the factors identified in §86.007-11 (a)(4)(iv)(A). If additional deficiencies are approved, the Executive Officer may set any additional conditions that he/she determines to be appropriate.

#### 4. Exemptions.

4.1 The requirements set forth in this section do not apply to "ultra-small volume manufacturers" for model years 2005 and 2006. For the purposes of this section, an "ultra-small volume manufacturer" means any manufacturer with California sales less than or equal to 300 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and heavy-duty engines per model year based on the average number of vehicles and engines sold by the manufacturer in the previous three consecutive model years.

4.2 The requirements set forth in this section do not apply to "urban buses", as defined in title 13, CCR, § 1956.2, for model years 2005 and 2006.

86.1372-2007 Measuring smoke emissions within the NTE zone. October 6, 2000.

This section contains the measurement techniques to be used for determining compliance

with the filter smoke limit or opacity limits in §86.1370-2007 (d)(3)(i).  
[No change to remainder of section.]

86.1380-2004 Load response test. October 6, 2000. [Delete]

## **Appendix I - Urban Dynamometer Schedules.**

(f)(2) EPA Engine Dynamometer Schedule for Heavy-Duty Diesel Engines.  
December 10, 1984.